

REMARKS

Applicant has amended claims 1, 4, 24, and 27 and has added new claims 42-51. In view of the above amendments and the following remarks, Applicant hereby requests further examination and reconsideration of the application, and allowance of claims 1-12, 24-32, and 42-51.

The Office has rejected claims 1-5, 7, 8, 10-12, 24-28, 30, and 32 under 35 U.S.C. 102(b) as being anticipated by US Patent No. 4,600,048 to Sato et al. ("Sato") and has rejected claims 6, 9, 29, and 31 under 35 U.S.C. 103(a) as being unpatentable over Sato. The Office asserts that Sato discloses a system for controlling solidification of the molten metal with a substrate (1), a writing system (9), and an erasing system (17). The Office asserts that the writing system is for imposing a thermal gradient on the substrate and that the writing system is a laser, a drive system (2), a container for molten metal, a nozzle connected to the container, and a pressure system to apply pressure dispense on the nozzle onto the substrate (figure 1). Additionally, the Office asserts that Sato fails to teach casting with a belt and a prism to reflect light, but asserts that Sato discloses that strip casting can be used in either a roller or a belt and discloses using a laser with a condenser lens.

Sato does not disclose or suggest, "a writing system that imposes a gradient pattern comprising multiple elements on at least a portion of at least one of the substrate on which the molten material is deposited and the molten material" as recited in claims 1 and 24. The Office's attention is respectfully directed to col. 3, lines 18-21 in Sato which discloses, "Similarly to these prior arts, the present invention is also directed to a method for casting a molten metal on a chill body while heating the chill body to keep its temperature within the proper range" (See also col. 6, lines 26-31 in Sato). As described at col. 3, line 45-48 in Sato, the high density energy source is used to heat the surface layer of the chill body. Further, as illustrated in FIGS. 3 and 4 and discussed at col. 4, lines 26-36 and col. 5, lines 21-66, the methods disclose that the many reflections smear or spread the laser beam to heat the chill body, not to form any type of gradient pattern. Accordingly, the only teaching in Sato is for a heating system for providing a general heating of a surface of the chill body using a high density energy source, i.e. a laser. Nowhere does Sato teach or suggest a writing system that imposes any type of gradient pattern on the substrate, let alone a gradient pattern comprising multiple elements on the substrate or molten material.

The present invention provides a process and system for high-speed (throughput) casting of a flat product of high quality which is achieved through the use of gradient patterns comprising multiple elements. As described in paragraph 38 in the above-identified patent application, the gradient pattern affects the solidification of the molten material and thus the resulting end product. By using a gradient pattern on the substrate, a high quality ribbon product can be produced. Some examples of thermal gradient patterns which could be imposed on substrate 12 are illustrated in FIGS. 5A-5D in the above-identified patent application.

Accordingly, in view of the foregoing amendments and remarks, the Office is respectfully requested to reconsider and withdraw the rejection of claims 1 and 24. Since claims 2-12 depend from and contain the limitations of claim 1 and claims 25-32 depend from and contain the limitations of claim 24, they are distinguishable over the cited reference and patentable in the same manner as claims 1 and 24.

Sato also does not disclose or suggest, “wherein the gradient pattern is a compositional gradient pattern” as recited in claims 4 and 27. The Office’s attention is respectfully directed to FIGS. 1, 3, and 4 and col. 4, line 67 to col. 5, line 2 and col. 5 lines 23-25 and 50-53, which illustrate and disclose that a laser beam radiation apparatus is used to heat the chill body. Nowhere does Sato teach or suggest a writing system that imposes any type of compositional gradient pattern on the chill body.

As disclosed in paragraph 27 in the above-identified patent application, “the nozzle 21 under the control of the compositional distribution system 23 and distributes dots or other portions of material on a portion of the substrate, for example portions of liquid that dry quickly to form a solid film.” As disclosed in paragraph 28 in the above-identified patent application, the compositional gradient pattern is a film deposited on the substrate which has been etched by laser ablation. Like the thermal gradient pattern, with the compositional gradient pattern, the present invention is able to control and produce a high quality ribbon product. Accordingly, in view of the foregoing amendments and remarks, the Office is respectfully requested to reconsider and withdraw the rejection of claims 4 and 27.

Applicant has also added new dependent claims 42-51 which are believed to be distinguishable over the cited references and in condition for allowance. A notice to this effect is respectfully requested.

In view of all of the foregoing, applicant submits that this case is in condition for allowance and such allowance is earnestly solicited.

Respectfully submitted,

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Gunnar G. Leinberg
Gunnar G. Leinberg
Registration No. 35,584

NIXON PEABODY LLP
Clinton Square, P.O. Box 31051
Rochester, New York 14603-1051
Telephone: (585) 263-1014
Facsimile: (585) 263-1600

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